

## Claims

- 1 A method for depositing a coating onto a substrate, said method comprising the introduction of an atomised coating forming material into an exciting medium, said exciting medium causing activation of the atomised coating forming material prior to the material being deposited onto a substrate to form the coating thereon and characterised in that the exciting medium is pulsed.
- 2 A method according to claim 1 characterised in that the pulsing of the excitation medium significantly retains the chemical properties of the atomised coating forming material.
- 3 A method according to claim 1 characterised in that an atomiser is used to introduce the coating forming material with each atomiser having a monomer supply connected thereto.
- 4 A method according to claim 1 characterised in that at least one additional material is added into the atomised coating forming material.
- 5 A method according to claim 4 characterised in that the additive material acts as a buffer to maintain the process pressure and/or carry the atomised coating forming material.
- 6 A method according to claim 4 characterised in that the additive material modifies and/or is incorporated into the coating forming material and/or the resultant coating.
- 7 A method according to claim 4 characterised in that the introduction of the additional materials to the atomised coating forming material is pulsed.

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8 A method according to claim 1 characterised in that the exciting medium is a pulsed plasma discharge.

9 A method according to claim 1 characterised in that the exciting medium is created by a pulsed flux of electromagnetic radiation.

10 A method according to claim 1 characterised in that the exciting medium is created by a pulsed flux of ionised particles or radicals.

11 A method according to claim 1 characterised in that the substrate to which the coating material is applied is located substantially inside the pulsed exciting medium during coating deposition.

12 A method according to claim 1 characterised in that the substrate to which the coating material is applied is located outside of the pulsed exciting medium during coating deposition.

13 A method of producing a multi-layered material coating on a substrate characterised in that the substrate is repeatedly exposed to excited coating forming material produced in accordance with the method of claims 1-12.

14 A method according to claim 13 characterised in that the nature of the exciting medium are changed during the coating formation.

15 A method according to claim 13 characterised in that the coating formed on the substrate is post-treated by exposure to an exciting medium.

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16 A method according to claim 13 characterised in that the substrate is pre-treated prior to coating by exposure to the exciting medium prior to coating deposition.

17 A method according to any of the preceding claims characterised in that the substrate is any of metal, glass, semiconductor, ceramic, polymer, woven or non-woven fibres, natural fibres, synthetic fibres, cellulosic material, or powder.

18 A method according to any of the preceding claims characterised in that the coating forming material comprises an organic, organosilicon, organometallic, or inorganic material, or mixtures thereof.

19 A method according to claim 1 characterised in that the atomised coating forming material is deposited via an ultrasonic nozzle supplied with coating forming material in the form of a liquid or liquid/solid slurry.

20 A method according to claim 1 characterised in that the atomised coating forming material is deposited via a nebulizer supplied with coating forming material in the form of a liquid or liquid/solid slurry and a carrier gas.

21 A method according to claim 1 characterised in that the atomised coating forming material is deposited via a plain-jet gas blast atomiser supplied with coating forming material in the form of a powder, and a carrier gas.

22 A method according to claim 1 characterised in that a plurality of atomisers are used to supply coating forming material to the excitation medium.

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23 A method according to claim 1 characterised in that the excitation medium and/or surrounding apparatus are heated.

24 A method according to claim 1 characterised in that the coated substrate is subject to derivatization.

25 A method for depositing a coating formed from a liquid coating forming material or a liquid mixed with substantially insoluble particles, characterised in that said method comprises the steps of atomising the coating forming material and introducing it into a pulsed exciting medium that facilitates the formation of activated precursor species to the coating these precursor species deposited onto a substrate, forming the coating.

26 A method according to claim 25 characterised in that the liquid is an organic or organo-silicon monomer or oligomers.

27 A method according to claim 25 characterised in that the precursor species are monomeric or oligomeric radicals and ions.

28 A method according to claim 25 characterised in that the atomised coating forming material passes through an atomiser or nebulizer.

29 A method according to claim 1 characterised in that the exciting medium contains the atomised coating forming material in the absence of other materials.

30 A substrate with a coating applied thereto, said coating applied in accordance with the method as described in any of claims 1-29.

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31 A coating formed in accordance with the method as described in any of claims 1-29.

32 Apparatus for the application of a coating to a substrate, said apparatus comprising a vacuum chamber, means for introducing coating forming material in an atomised form into the chamber, means for creating an exciting medium within the chamber, and a means for holding at least one substrate to be coated in the chamber, said atomising means directing the atomised coating forming material to pass through the exciting medium prior to reaching the substrate and characterised in that the means for creating the exciting medium is controlled so as to generate the exciting medium in a pulsed manner.

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